

**REMARKS:**

Claim 61 has been amended.

Claims 61 and 63-75 are pending in this application.

Claims 1 - 60 and 62 are cancelled.

Claim 61 has been amended to change "metal powder" to "metal flake," in order to provide consistency with the dependant claims. This amendment is fully supported by the Specification, for example at page 8, lines 14-18.

In the Office Action the Examiner rejects claims 61 and 63-75 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Published Patent Application No. 2003/0124259 to *Kodas, et al.* in view of U.S. Patent No. 5,098,771 to *Friend*.

Although admitting that *Kodas* does not teach use of a cure temperature lowering agent consisting of thermoplastic/thermosetting resins such as polyamide, polyester, polyvinyl chloride and epoxy as in the claims of the present invention, the Examiner states it would have been obvious to a person of ordinary skill in the art to substitute the binders in *Kodas, et al.*'s ink compositions with polyvinyl chloride as used in *Friend*. The Examiner further states that the results would be predictable and have reasonable expectation of success because *Friend* teaches that polyvinyl chloride is the equivalent to *Kodas*' binders. Applicant disagrees.

As stated in MPEP § 2143, in order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach all the claim limitations.

The Office Action states that *Kodas, et al.* teaches a "printing ink composition [comprising]...[a binder] such as acrylics polymers, epoxies, polyimide and urethanes (Abstract, Para: 0018, 0023, 0028-29, 0035, 0038, 0045, 0049, 0080, 0095, 0099-0102)." (Underline added). The Examiner concedes "[t]he prior art fails to teach printing the ink composition containing the specific cure temperature lowering agent per ... claim 61." See, Office Action, page 3, line 8 - page 4, line 2. The Office Action further states that *Friend* "teaches the composition of conductive inks for forming conductive trace containing silver flake/fiber/powder containing binders of thermoplastic/thermosetting resins such as polyamide, polyester, polyvinyl chloride, and epoxy (Cl. 1; lines 54-58; Cl. 2, lines 17-37, Cl. 3, lines 19-34; Cl. 4, lines 17-25)." See Office

Action, page 4, lines 3-6. (Underlining added) The Examiner contends that the teachings of *Friend* overcome the deficiencies of *Kodas, et al.*

The invention of *Friend* is directed to solving a different problem than *Kodas, et al.* *Friend* proffers a solution for a polymetric binder into which carbon fibrils are incorporated in a conductive ink. See, *Friend*, Abstract. *Kodas, et al.* proffers a solution for a precursor composition using silver and/or copper metal for formation of highly conductive features. See, *Kodas, et al.*, Abstract. In doing this, *Kodas, et al.* teaches use of other binders, as already recited herein. Applicant notes that *Kodas, et al.* includes no reference regarding inadequacy of the binders it teaches, nor any mention of a need to bond carbon fibrils, as in *Friend*. The present invention teaches the use of only a small quantity of polyvinylidene chloride, polyvinyl chloride, polyethylene vinyl chloride, or copolymers thereof to lower the cure temperature of the inventive high conductivity ink, not as a binding agent. See, for example, the Specification at page 8, line 26 - page 9, line 20, where the present invention's use of only a small quantity, preferably 0.5% - 10% by weight of these cure temperature lowering agents are used, and further where it is explained that higher amounts - such as necessary for use as

binders - would cause undesirable side effects, increased thickness and decomposition time. Indeed, these materials must be present in a high concentration, as in *Friend*, to act as a binder, which would be obvious. However, it is a surprising result - not obvious - that a small addition of these materials is capable of lowering the cure temperature.

The Applicant further contends that the combination of *Friend* with *Kodas, et al.* is based upon impermissible hindsight. The U.S. Supreme Court recently reaffirmed that "[a] factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of argument reliant upon ex post reasoning." *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 82 USPQ2d at 1397. See also *Graham v. John Deere Co.*, 383 U.S. at 36, 148 USPQ at 474. A statement that modifications of the prior art to meet the claimed invention would have been "well within the ordinary skill of the art at the time the claimed invention was made" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. Inter. 1993). At the time of the invention a person of ordinary skill in the art would not have

combined *Friend* with *Kodas, et al.* because *Friend* addresses a problem related to binders used with carbon fibrils, whereas *Kodas, et al.* does not address carbon fibrils or any problem with the binders used therein, whatsoever. Therefore, the Examiner has impermissibly used *Friend* as a guide or roadmap in formulating the obviousness rejection.

Furthermore, the Office Action simply provides conclusory remarks with regard to the obviousness of the invention. KSR expressly instructs that it remains legally insufficient to conclude that a claim is obvious just because each feature of a claim can be independently shown in the cited art. (KSR Opinion at p. 14). The Office Action fails to provide any supporting evidence to support these conclusory remarks. KSR makes clear that rejections on obviousness cannot be sustained by mere conclusory statements; instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. (KSR Opinion at p. 14). An Examiner must "identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does," (KSR Opinion at p. 15). And, the Examiner must make "explicit" this rationale of "the apparent reason to combine the known elements in the fashion claimed," including a detailed explanation of "the

effects of demands known to the design community or present in the marketplace" and "the background knowledge possessed by a person having ordinary skill in the art." (KSR Opinion at p. 14). Anything less than such an explicit analysis may not be sufficient to support a *prima facie* case of obviousness.

Thus, it is a surprising result that a small addition of polyvinylidene chloride, polyvinyl chloride, polyethylene vinyl chloride, or copolymers thereof as taught in the present invention is capable of lowering the cure temperature. Moreover, *Friend* actually teaches their typical use at higher concentrations as a binder. For example, *Friend* teaches incorporation of 1-4% by weight of carbon fibrils into the binder, which implies 96-99% by weight of binder. See *Friend*, col. 3, lines 34-41.

Also as expected with the high-concentration of these binders, the compositions taught in *Friend* are not highly conductive. In fact, the conductivity is too low to be effective in printing circuit traces. See *Friend*, claim 15, where resistivity of "<1 ohm" is claimed. The present invention results in resistivity 10,000 times lower (more conductive) than that taught by *Friend*. It is, indeed, very surprising that the current invention can achieve such high conductivity at low cure temperature by the addition of such a small quantity of

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polyvinylidene chloride, polyvinyl chloride, polyethylene vinyl chloride, or copolymers thereof. Thus, rejections of independent claim 61 and dependent claims 63-75 based on obviousness over *Kodas, et al.* in view of *Friend* should be withdrawn.

In view of the above amendments and remarks, this application is now believed to be in condition for allowance. Reconsideration is, therefore, respectfully requested. However, the Examiner is requested to telephone the undersigned if there are any remaining issues in this application to be resolved.

Respectfully submitted,

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